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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/677,350	10/02/2003	Zhibo Zhang	5051-531DV	9811
20792	7590	03/02/2004	EXAMINER	
MYERS BIGEL SIBLEY & SAJOVEC PO BOX 37428 RALEIGH, NC 27627			NGUYEN, DAO H	
			ART UNIT	PAPER NUMBER
			2818	

DATE MAILED: 03/02/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/677,350

Applicant(s)

ZHANG, ZHIBO

Examiner

Dao H Nguyen

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AW

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 23 January 2004.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-7 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-5 and 7 is/are rejected.
- 7) ☒ Claim(s) 6 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 02 October 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 1003 & 0104.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

### **DETAILED ACTION**

1. In response to the communications dated 10/02/2003 through 01/23/2004, claims 1-7 are active in this application.

### **Acknowledges**

2. Receipt is acknowledged of the following items from the Applicant.

Information Disclosure Statement (IDS) filed on 10/02/2003 and 01/23/2004 and made of record as Paper No. 1003 and 0104, respectively. The references cited on the PTOL 1449 form have been considered.

This application is a Divisional of the Patent Application No. 10/007,895, filed 11/06/2001, which claims the benefit of Provisional Application No. 60/252,306, filed 11/22/2000.

### **Specification**

3. The specification is objected to for the following reason:

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract

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on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

4. The specification has been checked to the extent necessary to determine the presence of possible minor errors. However, the applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

### **Claim Objection**

5. Claim 6 is objected to for the following minority: In claim 6, the word "transistors" should be changed to —transistor—since there is only one transistor. Appropriate correction is required.

### **Claim Rejections - 35 USC § 102**

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6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless —

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

7. Claim(s) 1-5 and 7 is/are rejected under 35 U. S. C. § 102 (e) as being anticipated by U.S. Patent No. 6,207,975 to Hergenrother et al.

Regarding claim 1, Hergenrother discloses a vertical field effect transistor, as shown in figures 2-3, comprising:

a microelectronic substrate 200 including a trench 225, the trench 225 defining a sidewall;

a conformal monocrystalline silicon layer (surface of silicon plug 230) on the sidewall of the trench 225, the conformal monocrystalline silicon layer on the sidewall of the trench including a drain region 232 adjacent the substrate 200, a source region 233 remote from the substrate and a channel region between the source and drain regions 232, 233;

a plug 230 in the trench 225 that includes the conformal monocrystalline silicon layer on the sidewall thereof;

a gate insulating layer 250 adjacent the channel; and

a gate electrode 265 on the gate insulating layer 250 opposite the channel. See figures 3(A-P) and column 8, line 31 to column 11, line 48.

Regarding claim 2, Hergenrother discloses the field effect transistor wherein the conformal monocrystalline silicon layer on the sidewall of the trench is a continuous conformal monocrystalline silicon layer on the sidewall of the trench. See figures 3.

Regarding claim 3, Hergenrother discloses the field effect transistor wherein the conformal monocrystalline silicon layer on the sidewall of the trench comprises spaced apart conformal portions of the conformal monocrystalline silicon layer on the sidewall of the trench. See figure 3P.

Regarding claim 4, Hergenrother discloses the field effect transistor further comprising:

- a first layer 210 on the substrate 200; and
- a second layer 220 on the first layer 210 opposite the substrate 200;
- wherein the trench extends in the first layer 210 and the second layer 220; and
- wherein the gate insulating layer 250 and the gate electrode 265 are between the first 210 and second 220 layers. See figure 3P.

Regarding claim 5, Hergenrother discloses the field effect transistor wherein the first and second layers comprise phosphosilicate glass and/or borosilicate glass. See column 8, lines 44-62.

Regarding claim 7, Hergenrother discloses the field effect transistor further comprising a silicon layer 205 between the microelectronic substrate 200 and the drain region 232. See figure 3P.

### **Allowable Subject Matter**

8. Claim(s) 6 is objected to as being dependent upon a rejected base claim 1, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims, since the prior art of record and considered pertinent to the applicant's disclosure does not teach or suggest the claimed vertical field effect transistor comprising (in addition to the other limitations in the claim) a plug in the trench which comprises high dielectric constant material.

### **Conclusion**

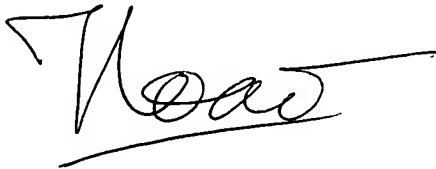
9. A shortened statutory period for response to this action is set to expire 3 (three) months and 0 (zero) day from the day of this letter. Failure to respond within the period for response will cause the application to become abandoned (see M.P.E.P 710.02(b)).

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dao H. Nguyen whose telephone number is (571)272-1791. The examiner can normally be reached on Monday-Friday, 9:00 AM – 6:00 PM.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Nelms can be reached on (571)272-1787. The fax numbers for all communication(s) is 703-872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.



Dao H. Nguyen  
Art Unit 2818  
February 11, 2004



David Nelms  
Supervisory Patent Examiner  
Technology Center 2800